SECTION 58

SEAWATER SYSTEMS

58.1 REFERENCES

(58A) Code of Federal Regulations - 46 CFR Sub-chapter F

(58B) Code of Federal Regulations - 46 CFR Sub-chapter H

(58C) NATIONAL FIRE PROTECTION ASSOCIATION - NFPA 13 (*2002 Edition*), *Installation of Sprinkler Systems*

58.2 INTRODUCTION

This Section describes the Contractor Design and Provide general requirements for seawater piping systems that serve the functions of fire fighting. These requirements are supplemented by other Sections of the Technical Specification.

For WSF Fleet-wide Standardization purposes, End No. 1 of the Vessel shall always be considered the bow, and this designation shall delineate port and starboard, fore and aft wherever they are addressed in the Technical Specification.

58.3 GENERAL

The seawater piping systems shall be arranged to permit multiple segments of the system to be isolated for repairs. Isolation valves shall be provided in the supply/return piping serving each machinery and equipment item.

All seawater systems shall be equipped with pressure displays, pump status indicators, pushbutton operators, and low pressure alarms at the EOS as described in Sections 85 and 99 of the Technical Specification. The pressure display shall be located on a gage board in a location within the EOS as approved by the WSF Representative. The pushbutton operators and indicators shall be located on the EOS Control Console in a location approved by the WSF Representative. See the *GENERAL* Subsection in Section 85 of the Technical Specification.

See Section 11 of the Technical Specification for the Bilge Piping System. See Section 73 of the Technical Specification for the general requirements for seawater pumps. See Section 74 of the Technical Specification for general piping and material requirements. See Section 75 of the Technical Specification for insulation and lagging requirements. See Section 91 of the Technical Specification for additional requirements.

58.4 FIREMAIN AND SPRINKLING SYSTEMS

58.4.1 Firemain System

An approved Firemain System shall be provided in accordance with this Section of the Technical Specification, USCG and 46 CFR §76.10, and all other Authoritative Agency requirements. Two (2) fire pumps CARVER 4NC2, or equal, centrifugal type, shall be provided, with one (1) fire pump located in each of the two (2) Engine Rooms. The Firemain System shall be a dry type system with adequate provisions for draining the system via sloped piping and low point drains after it is charged. Firemain drains shall lead to overboard discharges and **not to the bilges**. The intent of WSF is to drain back all Firemain piping down to a level below the Lower Vehicle when the system is not in use.

In addition to providing water to the Firemain system, the fire pumps shall be used to supply the Vehicle Deck Manual Sprinkling System. The fire pumps shall be properly sized to supply both Firemain and Vehicle Deck Manual Sprinkling Systems simultaneously. The electric motors powering the pumps shall be sized to prevent an overload condition under all possible operating scenarios.

The Firemain and Manual Sprinkler systems shall each contain a globe valve and CENTERLINE, MARK CONTROLS CORP., Series 800, elastomer-lined insert check valve, as set forth in Section 74 of the Technical Specification, in the overboard piping to prevent motor overload and limit flow during discharge, and allow for local immediate adjustment of pressure/flow.

Fire Stations shall be located throughout the Vessel to provide the necessary hose coverage to meet the regulatory requirements, utilizing fifty (50) foot long hoses and spanner wrenches. Fire Stations shall be fitted with 2½" × 1½" × 1½" Siamese connections to allow the use of 1½ inch fire hoses in all locations allowed by the Authoritative Agencies. All fire hoses shall meet the requirements of 46 CFR §76.10-10 as to quantity and length. For WSF Standardization purpose, provide U.S. Coast Guard approved, AKRON BRASS, Style 3019 with pistol grip or Style 3025, as appropriate, nozzles at each Fire Station. Provide all foundations, hangers, and brackets for all equipment.

Fire Station locations shall not adversely affect Vessel Passenger flow, Crew flow, vehicle parking, or vehicle capacity. Fire stations located in public spaces shall be recessed flush with the bulkhead and the opening fitted with a wire-inserted glass door. Fire stations on the Vehicle Decks shall be recessed flush into plating on un-stiffened sides of bulkheads or mounted flush with stiffeners on stiffened sides of bulkheads. Provide one (1) U.S. Coast Guard approved International Shore Connection, and for WSF Standardization purposes, one (1) 4-inch STORZ pump nozzle connection at each End of the Vessel.

For each fire pump, provide one (1) duplex strainer on the suction side of the pump. Strainers shall be identical with bronze body, quick opening yoke lids and Monel baskets. Provide two (2) spare Monel baskets. Provide drip trays under both strainers. Installation shall include differential pressure gages at each strainer.

In addition, one (1) of the fire pumps shall be provided with a suction connection from the Hi-Fog Water Mist Fire Suppression System/Back-flush Fresh Water Storage Tank to allow the Firemain and Manual Sprinkling Systems to be flushed with fresh water after each use.

For each fire pump provide a recirculation line with a properly sized orifice to limit pump discharge pressure in accordance with 46 CFR §76.10-5(d). The intent of this requirement is to eliminate the need for relief valves on the fire pump discharges. See Section 74 of the Technical Specification for additional orifice requirements.

Fire pump suction and discharge valves shall be arranged in manifold configurations for ease of access and operation.

58.4.2 Vehicle Deck Manual Sprinkling System

An approved Manual Sprinkling System shall be provided to protect the Upper and Lower Vehicle Decks on the Vessel. System shall be provided in accordance with this Section of the Technical Specification, USCG and 46 CFR §76.23, and all other Authoritative Agency requirements. The fire pumps shall be used to supply the sprinkling system water requirements.

The sprinkling system shall be divided into zones with a central valve manifold located adjacent to the Engineer's Operating Station (EOS) mounted longitudinally in the Engineer's Starboard Crew Locker Room/Stores area.

Sprinkler heads shall be located no lower than the bottom of the deepest structural members in the Vehicle Deck overheads to avoid adversely affecting Vehicle Deck vertical clearances.

Low points in the sprinkling system shall be fitted with ⅜ inch diameter drain holes to weather, to empty the system when not in use as set forth in the *INSTALLATION* Subsection in Section 74 of the Technical Specification. Pipe runs shall be sloped to drain water to the low points.

A connection to the Vessel's service compressed air system shall be provided to blow down the sprinkling system after use. The compressed air shall be routed through a check valve and full-port ball valve immediately adjacent to and upstream of the manifold air stop valve, and readily accessible from the sprinkler manifold. The low-point of the sprinkler manifold shall drain to the Engine Room bilge through a full-port ball valve readily accessible from the sprinkler manifold. Compressed air for blowing down the sprinkler manifold and distribution piping shall be supplied from the compressed air system described in Section 72 of the Technical Specification.

58.5 SEAWATER COOLING SYSTEMS

No seawater cooling will be allowed for machinery. All machinery shall be fresh water cooled, with the exception of refrigeration and air conditioning condensing units located above the LVD, which shall be air cooled.

58.6 CLEANING AND FLUSHING

All piping, piping components and equipment shall be thoroughly cleaned after fabrication and prior to installation.

After complete installation, each system shall be thoroughly cleaned and flushed of all foreign matter with clean fresh water in accordance with this Section and Section 74 of the Technical Specification. System flushing shall be conducted at or below the system's maximum operating pressure and above normal line velocity.

Prior to flushing operations, pumps, pressure and flow control valves, and other similar devices capable of being affected by the carryover of foreign matter, shall either be removed or blanked-off and bypassed. Flushing shall be accomplished utilizing pumping devices that **do not** form a part of any piping system permanently installed in the Vessel.

Temporary basket strainers fitted with basket or cone strainers with 10×10 wire cloth strainers, and magnets, shall be employed throughout the flushing process. System cleanliness shall be evidenced by the basket strainers containing no debris visible to the naked eye after two (2) hours of full flow operation.

Except on copper-nickel or copper pipe, pneumatic or electric motor driven line vibrators of the temporary in-line and/or portable hand types shall be continuously employed during the cleaning process. The vibrators shall be firmly affixed to the piping throughout the cleaning cycle. Portable vibrators shall be occasionally repositioned during the cleaning process throughout all accessible portions of the piping.

Flux removal, where applicable, shall be accomplished as set forth in Section 74 of the Technical Specification.

58.7 SPARE PARTS AND INSTRUCTION MANUALS

Provide a list of recommended spare parts and special tools for those items that are Contractor furnished, together with parts lists and instruction manuals necessary to maintain and service provided equipment and accessories in accordance with the requirements of Sections 86 and 100 of the Technical Specification.

58.8 TESTS, TRIALS, AND INSPECTIONS

Firemain and Sprinkling Systems shall be subjected to a hydrostatic test and shall be operated to show proper pressure, flow and coverage in service, all as described in Section 101 of the Technical Specification, and as required by the Authoritative Agencies.

All seawater systems shall be tested in accordance with Section 101 of the Technical Specification.

Inspections shall be performed as defined in this Section and Section 1 of the Technical Specification.

58.9 PHASE II TECHNICAL PROPOSAL REQUIREMENTS

The following deliverables, in addition to others required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase II Technical Proposal stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. Piping System Calculations - Fire Main and Manual Sprinkling Systems

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

58.10 PHASE III DETAIL DESIGN AND CONSTRUCTION REQUIREMENTS

The following deliverables, in addition to others required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase III Detail

Design stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. Piping System Calculations - Fire Main and Manual Sprinkling Systems

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

(END OF SECTION)